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ALERT SERVICE BULLETIN REVISION NOTICE

ENGINE — BLADE ASSEMBLY, 1ST STAGE, LOW PRESSURE COMPRESSOR (LPC) — THERMAL ACOUSTIC IMAGE (TAI) INSPECTION TO DETECT AIRFOIL CRACKS

Turbojet Engine Alert Service Bulletin No. PW4G-112-A72-268 Revision No. 7 dated September 6, 2018.

Revision History

Original Issue July 15, 2004

Revision 1 dated January 17, 2008

Revision 2 dated April 9, 2010

Revision 3 dated May 11, 2010

Revision 4 dated April 12, 2011

Revision 5 dated February 11, 2014

Revision 6 dated August 5, 2014

Revision 7 dated September 6, 2018

Reason for the Revision

To revise inspection thresholds and intervals for the Thermal Acoustic Image (TAI) inspection.

Effect of Revision on Prior Compliance

None.

This is a Complete Revision (Not Applicable to the SGML version)

The contents are in accordance with the list of effective pages. All pages have the current revision number. Technical changes are marked with black bars.

MODEL APPLICATION

PW4074, PW4074D, PW4077, PW4077D, PW4084D, PW4090, PW4090-3

BULLETIN ISSUE SEQUENCE

PW4G-112 Series A72-268

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A copy of this Revision Notice and any future revision notices must be filed as a permanent record with your copy of the subject bulletin.

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PW4074, PW4074D, PW4077, PW4077D, PW4084D, PW4090, PW4090-3

BULLETIN ISSUE SEQUENCE

PW4G-112 Series A72-268

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Compliance Category

3

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REVISION NO. 7 - September 6/18

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Summary

The purpose of this Alert Service Bulletin is to define Thermal Acoustic Image (TAI) inspection intervals for the PW4000 hollow fan blades.

During the manufacture of the details, improper polishing and machining operations resulted in spark impingement and imbedded tungsten carbides in the hollow fan blade. This can create stress concentrations which can potentially initiate an internal airfoil crack. Extensive lab testing and research has determined that micro-texture is a condition that can occur naturally in titanium materials during the forging process where there is alignment of the grain structure into small colonies. In high stress locations micro-texture can potentially initiate a crack in the material depending on the size and orientation of the colony. TAI inspection is used to detect internal cracks in the airfoil.

NOTE: This Alert Service Bulletin supersedes Reference 8, Alert Service Bulletin PW4G-112-A72-246.

Planning Information

Effectivity Data

Engine Models Applicable

PW4074, PW4074D, PW4077, PW4077D, PW4084D, PW4090, PW4090-3
Engine Serial Nos. — All Engines.

NOTE: The engine serial number effectivity data and its related engine model identification contained in this Alert Service Bulletin are taken from the records of part(s) incorporation during initial manufacture.

After initial engine manufacture, but before final delivery, P&W may change part(s) in the engine or change the model identification of the engine. Such action is recorded on FAA337 forms.

To find Alert Service Bulletin PW4G-112-A72-268 models that are applicable, the owner/operator of the engine must compare the Service Bulletin List supplied with the engine as sent from P&W and the List of Changes incorporated at the Airframer from FAA337 forms to the Alert Service Bulletin PW4G-112-A72-268 Effectivity section.

The PW4090 Engine effectivity is also applicable to all the PW4090 de-rate models (PW4074D, PW4077D, and PW4084D) unless otherwise specified.

Concurrent Requirements

There are no concurrent requirements.

Reason

1. Problem: Inspection intervals must be defined for cracks originating on the internal cavities of the hollow fan blade. Such cracks may propagate and eventually could result in an airfoil fracture.
2. Cause: Improper polishing and machining operations during the manufacture of the hollow fan blade details resulted in spark impingement and imbedded tungsten carbides. This can create stress concentrations which can potentially initiate an internal airfoil crack. Micro-texture is a condition that can occur naturally in titanium materials during the forging process where there is alignment of the grain structure into small colonies. In high stress locations micro-texture can potentially initiate a crack in the material depending on the size and orientation of the colony.

3. Solution: Provide inspection intervals for a TAI inspection that has been developed to detect these cracks prior to airfoil fracture.

Description

Remove 1st stage Low Pressure Compressor (LPC) Blade Assemblies at the appropriate interval for TAI inspection.

Compliance

Category 3

Do an inspection of the 1st Stage Low Pressure Compressor (LPC) Blade Assemblies, PN 52A241, PN 55A901, PN 55A901-001, PN 55A801, PN 55A801-001, PN 56A201, PN 56A201-001, or PN 56A221 on a scheduled and repetitive basis. The intervals for the removal of blades for this inspection are shown in Table 1.

Table 1: PW4074, PW4077, PW4074D, PW4077D, PW4084D, PW4090, PW4090-3 models

For Blade: PN 52A241, PN 55A901, PN 55A901-001, PN 55A801, PN 55A801-001, PN 56A201, PN 56A201-001, and PN 56A221
For a blade that has not been TAI inspected OR a blade that has accumulated less than 6,500 cycles since its last TAI inspection, do a TAI inspection of the blade at next M-flange separation or prior to accumulating 7000 cycles since new or last TAI inspection, whichever occurs first (see note). For a blade that has accumulated 6,500 cycles or more since its last TAI inspection OR a blade that has not been TAI inspected that has accumulated 6,500 cycles or more do a TAI inspection within 500 cycles or 180 days, whichever occurs first, after issuance of this Service Bulletin (see note). In addition: 1. In instances where a blade is installed in an engine and the cycles since the blade was new cannot be determined OR the cycles since the blade was last TAI inspected cannot be determined inspect the blade within 500 flight cycles or 180 days, whichever occurs first, after issuance of this Service Bulletin (see note). 2. In instances where a blade is not installed in an engine and the cycles since the blade was new cannot be determined OR the cycles since the blade was last TAI inspected cannot be determined the blade must be TAI inspected prior to installation in an engine (see note). 3. All blades that have never been TAI inspected but have accumulated greater than 1,000 cycles must be inspected prior to December 31, 2027 (see note). NOTE: Perform a TAI inspection of the blade as specified in Reference 9, CIR Manual 51A750, Chapter/Section 72-31-82, Inspection/Check-02, paragraph 1.H., Thermal Acoustic Image Inspection (Vendor Application).
For a blade that has been inspected one time after the issue date of this Service Bulletin revision, do a repetitive TAI inspection of the blade as follows: When a fan blade has accumulated 1,000 cycles or more since the last TAI inspection do an inspection at every M-flange separation not to exceed 6,500 cycles (see note). NOTE: Perform a TAI inspection of the blade as specified in Reference 9, CIR Manual 51A750, Chapter/Section 72-31-82, Inspection/Check-02, paragraph 1.H., Thermal Acoustic Image Inspection (Vendor Application).

Approval Data

The times between inspections specified in Compliance and the inspection procedures specified in the Accomplishment Instructions agree with the applicable Federal Aviation Regulations and are FAA-Approved for the engine model(s) given.

Manpower

The estimate of man-hours of labor directly necessary to do the intent of this Alert Service Bulletin are as follows:

1. Open and Close Cowl Doors 0.5
2. Necessary for Removal of Fan Blades 3.0
3. Total Necessary Man-hours (for engines installed on aircraft) 3.5
4. Total Necessary Man-hours (for engines not installed on aircraft) 3.0

Weight Data

No Change.

Electrical Load Data

Not Applicable.

Software Accomplishment Summary

Not Applicable.

References

1. Turbojet Engine Standard Practices Manual, Part No. 585005.
2. PW4074, PW4077 Turbofan Engines, Illustrated Parts Catalog, Part No. 51A346.
3. PW4074D, PW4077D, PW4084D, PW4090, PW4090-3, PW4090D, PW4098 Turbofan Engines, Illustrated Parts Catalog, Part No. 51A742.
4. PW4074, PW4077 Turbofan Engines, Engine Manual, Part No. 51A345.
5. PW4074D, PW4077D, PW4084D, PW4090, PW4090-3, PW4090D, PW4098 Turbofan Engines, Engine Manual, Part No. 51A751.
6. Boeing 777 Aircraft Maintenance Manual.
7. Spare Parts Notice P3117 — Introduction Of New First Stage Fan Blade Assembly.
8. Alert Service Bulletin No. PW4G-112-A72-246; Engine — Blade Assembly, 1st Stage, Low Pressure Compressor (LPC) — Ultrasonic Inspection To Detect Airfoil Cracks. Issue Sequence A72-246, PW4G-112 Series.
9. PW4000 Series 112 Inch PW4074, PW4077, PW4077D, PW4084D, PW4090, PW4098 Turbofan Engines, Engine Cleaning, Inspection And Repair (CIR) Manual, Part No. 51A750.

Publications Changed

Not Applicable.

Interchangeability

Old and new parts are directly interchangeable.

Information in the Appendix

Alternate Accomplishment Instructions (No)

Progression Charts (No)

Added Data (Yes)

Revision to Table of Limits (No)

Inspection Procedures (No)

Material Information

Material — Cost and Availability

1. There is no new material cost to do this Alert Service Bulletin.
2. There is no kit provided to do this Alert Service Bulletin.
3. Part availability information is provided in material data Instructions — Disposition.

Industry Support Program

Not Applicable.

The material data that follows is for each engine.

NOTE: It is possible to use the Chapter/Section and Figure/Item reference number shown below the old part number to find the part in the Illustrated Parts Catalog.

CAUTION: THE FOLLOWING MATERIAL DATA TABLE(S) ARE ORGANIZED BY ILLUSTRATED PARTS CATALOG. ALL PARTS IN THE TABLE(S) MAY OR MAY NOT BE APPLICABLE TO ALL THE ENGINE MODELS SHOWN IN THE TABLE HEADING. YOU MUST REFER TO THE APPROPRIATE ILLUSTRATED PARTS CATALOG FOR ENGINE MODEL APPLICABILITY USING THE OLD PART NUMBER (PN) AND CATALOG SEQUENCE NUMBER. FAILURE TO INSTALL THE PART(S) IN THE CORRECT ENGINE MODEL MAY RESULT IN A CONFIGURATION THAT IS NOT FAA APPROVED.

The material data that follows is for each engine.

For PW4074, PW4077 Engines:

New PN	Qty	Estimate of Unit Price ($)	Keyword	Old PN	Instructions — Disposition
	22		BLADE — ASSY OF, LPC, 1STG	52A241 (72-31-00-2-1 D)	(4)(X)
			OR		
	22		BLADE — ASSY OF, LPC, 1STG	55A901 (72-31-00-2-1)	(4)(X)
			OR		
	22		BLADE — ASSY OF, LPC, 1STG	55A901-001 (72-31-00-2-1BA)	(4)(X)
			OR		
	22		BLADE — ASSY OF, LPC, 1STG	55A801 (72-31-00-2-1 A)	(4)(X)
			OR		
	22		BLADE — ASSY OF, LPC, 1STG	55A801-001 (72-31-00-2-1BB)	(4)(X)
			OR		

New PN	Qty	Estimate of Unit Price ($)	Keyword	Old PN	Instructions — Disposition
	22		BLADE — ASSY OF, LPC, 1STG	56A201 (72-31-00-2-1 B)	(4)(X)
			OR		
	22		BLADE — ASSY OF, LPC, 1STG	56A201-001 (72-31-00-2-1BC)	(4)(X)
			OR		
	22		BLADE — ASSY OF, LPC, 1STG	56A221 (72-31-00-2-1 C)	(4)(X)

The material data that follows is for each engine.

For PW4074D, PW4077D, PW4084D, PW4090, PW4090-3 Engines:

New PN	Qty	Estimate of Unit Price ($)	Keyword	Old PN	Instructions — Disposition
	22		BLADE — ASSY OF, LPC, 1STG	52A241 (72-31-00-2-1 B)	(4)(X)
			OR		
	22		BLADE — ASSY OF, LPC, 1STG	56A201 (72-31-00-2-1)	(4)(X)
			OR		
	22		BLADE — ASSY OF, LPC, 1STG	56A201-001 (72-31-00-2-1BA)	(4)(X)
			OR		
	22		BLADE — ASSY OF, LPC, 1STG	56A221 (72-31-00-2-1 A)	(4)(X)

Modification and Spares Information

Not Applicable.

Parts Modification Conditions

(4) Do an inspection as specified in the Accomplishment Instructions.

Spare Parts Availability

(X) See Reference 2 or 3, Illustrated Parts Catalog, for applicable replacement parts.

Vendor Services or Special Components/Materials

Location For Return Of Fan Blades For Thermal Acoustic Image Inspection

P&W Designation	Vendor Designation	Name	Vendor Name & Address
52A241		BLADE — ASSY OF, LPC, 1STG	Pratt & Whitney 400 Main Street Well #14 East Hartford, CT 06108 U.S.A.
55A901			
55A901-001			
55A801			
55A801-001			
56A201			
56A201-001			
56A221			

Material Data for Each Spare Engine

The material for each spare engine is as stated in the preceding material information section.

Reidentified Parts

Not Applicable.

Necessary Tools

No more Support Equipment is necessary.

Other Material Information Data

Not Applicable.

Accomplishment Instructions

PART A — ENGINES INSTALLED ON AIRCRAFT

NOTE: SERVICE BULLETIN INCORPORATION ON ENGINES INSTALLED ON AIRCRAFT MAY BE DESIRABLE AND SHOULD BE INDIVIDUALLY EVALUATED.

NOTE: This Alert Service Bulletin supersedes Reference 8, Alert Service Bulletin PW4G-112-A72-246.

1. The removal of 1st Stage LPC Blades (Fan Blades), PN 52A241, PN 55A901, PN 55A901-001, PN 55A801, PN 55A801-001, PN 56A201, PN 56A201-001, and PN 56A221, for TAI inspection is dictated by the guidelines in the Compliance Section of this Alert Service Bulletin. When removal of blades is dictated by these guidelines, proceed as follows:

   A. Remove the 1st Stage LPC Blades (Fan Blades) as specified in Reference 6, Boeing 777 Aircraft Maintenance Manual, Chapter/Section 72-31-02.

   B. Return the 1st Stage LPC Blades (Fan Blades) for TAI inspection to the approved source listed in the Vendor Services section.

2. Replace the removed Fan Blade Assemblies as specified in Reference 6, Boeing 777 Aircraft Maintenance Manual, Chapter/Section 72-31-02.

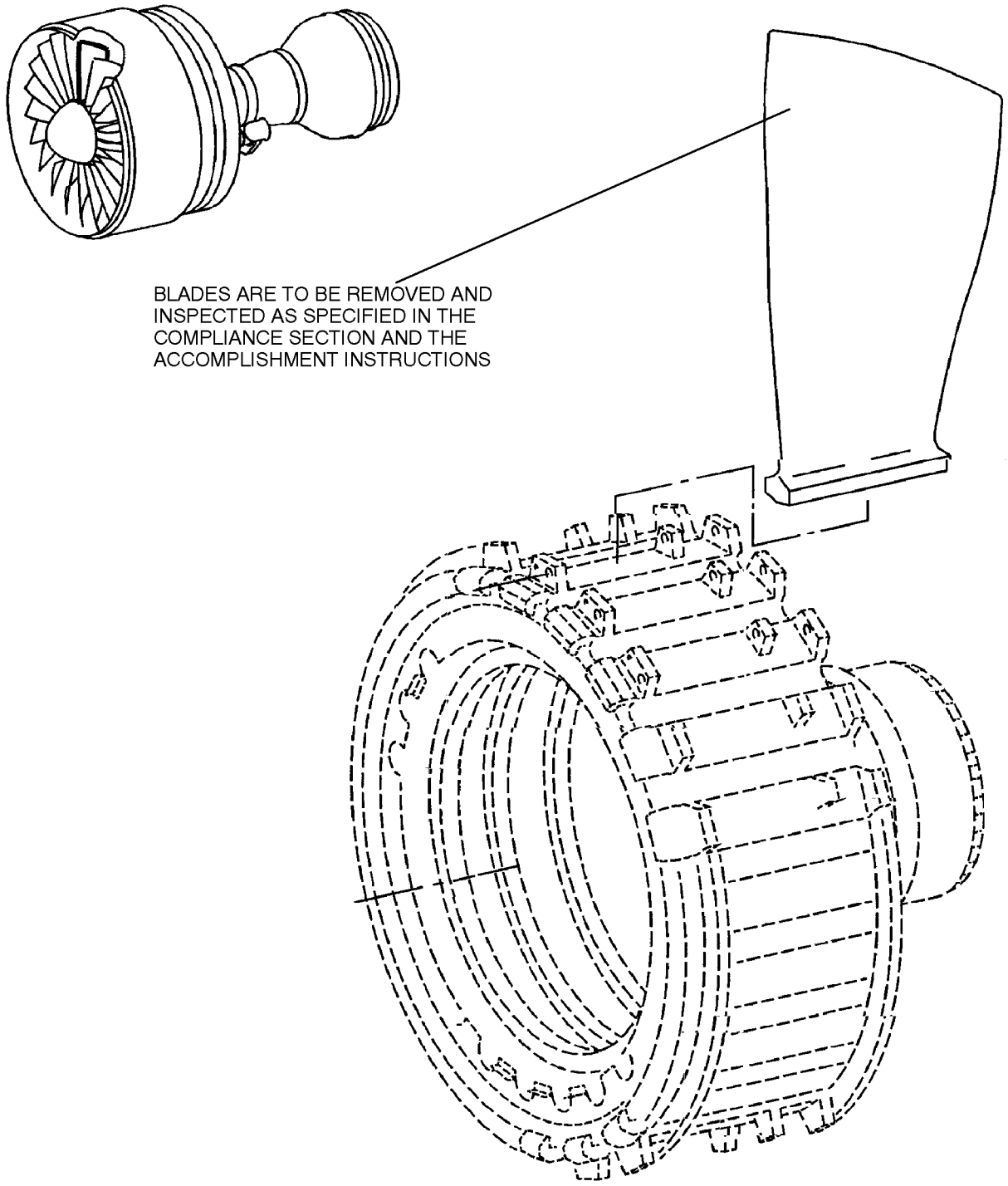
PART B — ENGINES NOT INSTALLED ON AIRCRAFT

1. The removal of 1st Stage LPC Blades (Fan Blades), PN 52A241, PN 55A901, PN 55A901-001, PN 55A801, PN 55A801-001, PN 56A201, PN 56A201-001, or PN 56A221 for TAI inspection is dictated by the guidelines in the Compliance Section of this Alert Service Bulletin. When removal of blades is dictated by these guidelines proceed as follows:

   A. Remove the 1st Stage LPC Blades (Fan Blades) as specified in Reference 4, or 5, Engine Manuals, Chapter/Section 72-00-31, Removal-03.

   B. Return the 1st Stage LPC Blades (Fan Blades) for TAI inspection to the approved source listed in the Vendor Services section.

2. Replace removed Fan Blade Assemblies as specified in Reference 4, or 5, Engine Manuals, Chapter/Section 72-00-31, Installation-03.



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LOCATION OF 1ST STAGE LPC BLADE ASSEMBLIES
72-31-00
FIGURE 1

Appendix

Added Data

Internal Reference Information

Revision No.	Reference Document	Origination
Original	98KB296C	AH/MJS
1	IEN98KB296D	ERC/JFC
2	REA10KC156	DP/RCW
3	EA10KC549	DP/JEJ
4	EA11KC320	MSR/RDG
5	EA11KC320	ERB/MJS
6	PSAF14KC670	ERB/MJS
7	EA 11KC320D PSAF 11KC320E	ERB/RCM